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ABSTRACT:

A gallery widget (203) is invoked when a tag in a markup language document, such as a web page, is processed. The gallery widget selects a number of images specified in the tag and places the images in the markup language document as defined by the tag. The images are selected from a gallery (201) containing all images available for display or from a pool of images (215) chosen from the gallery using a gallery administration tool (213).

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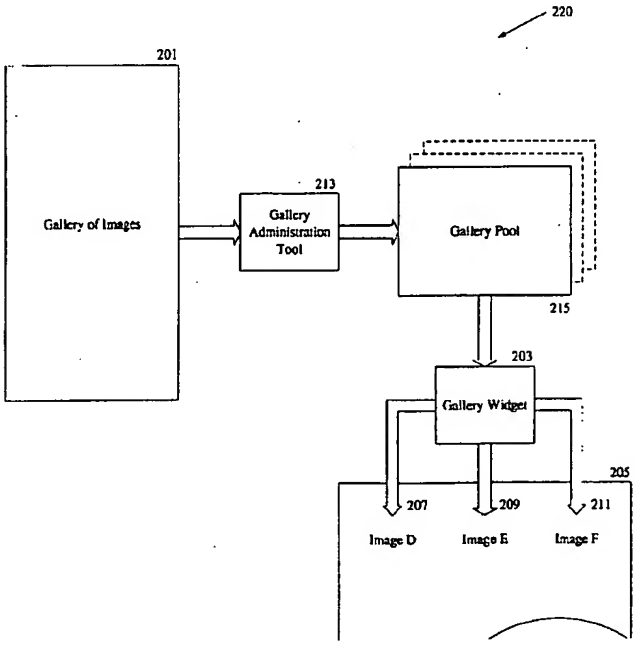
(54) Title: DYNAMIC SELECTION OF IMAGES FOR WEB PAGES



(57) Abstract: A gallery widget (203) is invoked when a tag in a markup language document, such as a web page, is processed. The gallery widget selects a number of images specified in the tag and places the images in the markup language document as defined by the tag. The images are selected from a gallery (201) containing all images available for display or from a pool of images (215) chosen from the gallery using a gallery administration tool (213).

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DYNAMIC SELECTION OF IMAGES FOR WEB PAGES

FIELD OF THE INVENTION

This invention relates generally to content displayed as pages on the World Wide Web, and more particularly to selecting images as part of such content.

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BACKGROUND OF THE INVENTION

Images are frequently used on World Wide Web (web) pages as illustration and to make the pages more attractive. Both purposes are particularly important when the Web site displaying the pages is a business. A user is more likely to explore a web site that shows images of the items for sale. In a Web-based business, such as an auction site, in which the inventory turns over rapidly, regenerating one or more web pages to display new images is especially important. However, choosing the new images to display is currently a manual process and thus cannot be accomplished as rapidly as may be desirable. Furthermore, once the images are selected, they must be integrated with the other content on the web page. Therefore, it would be advantageous to provide for the dynamic selection of images for web pages and for the automatic integration of the selected images to permit frequent and rapid modifications of the web pages.

SUMMARY OF THE INVENTION

The above-mentioned shortcomings, disadvantages and problems are addressed by the present invention, which will be understood by reading and studying the following specification.

A gallery widget provides for the automatic selection and integration of images in a markup language document, such as a web page. A widget tag is encoded on the web page that invokes the gallery widget when the page is being processed for display. The gallery widget is a utility program that selects a pre-determined number of images from a group of images and places the images on the web page. The number of images and their location on the web page are specified in the widget tag. The gallery widget can select the images from a gallery that contains all available images or from a pool of images created from the gallery using a gallery administration tool.

Because the gallery widget is automatically invoked when the page is being readied for display, there is no manual intervention required so web pages encoded with the widget tag can be regenerated as frequently as necessary to maintain current images on the pages. When it is desirable to choose certain types of images during a time period, such as for promotional purposes, the gallery administration tool allows a user to create a pool of images having common characteristics in advance.

The present invention describes systems, methods, and computer-readable media of varying scope. In addition to the aspects and advantages of the present invention described in this summary, further aspects and advantages of the invention will become apparent by reference to the drawings and by reading the detailed description that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagram of one embodiment of a transaction facility suitable for practicing the present invention;

FIGs. 2A-B are block diagrams illustrating two embodiments of the invention;

FIGs. 3a-B are flowcharts of a gallery widget method to be performed by a computer according to an embodiment of the invention;

FIG. 4 is a flowchart of a gallery administration tool method to be performed by a computer according to an embodiment of the invention; and

FIG. 5 is a diagram of one embodiment of a hardware and software operating environment suitable for practicing the present invention.

DETAILED DESCRIPTION OF THE INVENTION

In the following detailed description of embodiments of the invention, reference is made to the accompanying drawings in which like references indicate similar elements, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that logical, mechanical, electrical and other changes may be made without departing from the scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims.

An overview of a network-based transaction facility in which embodiments of the invention may be practiced is first described to provide a context for the invention. Next the operations and methods of the invention are described in conjunction with block diagrams and flowcharts. An exemplary computer hardware and software environment suitable for use with the invention are then described. Finally a conclusion of the detailed description is presented.

Transaction Facility

The following description of FIG. 1 is intended to provide an overview of a network-based transaction facility (e.g., business-to-business, business-to-consumer and consumer-to-consumer Internet marketplaces and retailers) but is not intended to limit the applicable computer environments. One of skill in the art will immediately appreciate that the invention can be practiced with other computer system configurations, including hand-held devices, multiprocessor systems, microprocessor-based or programmable consumer electronics, network PCs, minicomputers, mainframe computers, and the like. For the purposes of the present specification, the term "transaction" shall be taken to include any communications between two or more entities and shall be construed to include, but not be limited to, commercial transactions including sale and purchase transactions, auctions and the like. While exemplary embodiments of the present invention is described within the context of an Internet auction facility 10 as shown in FIG. 1, it will be appreciated by those skilled in the art

that the invention will find application in many different types of computer-based, and network-based, commerce facilities.

The auction facility 10 includes one or more of a number of types of front-end servers, namely page servers 12 that deliver web pages (e.g., markup language documents), picture servers 14 that dynamically deliver images to be displayed within web pages, listing servers 16, CGI servers 18 that provide an intelligent interface to the back-end of facility 10, and search servers 20 that handle search requests to the facility 10. E-mail servers 21 provide automated e-mail communications to users of the facility 10 and other services as known in the art.

The back-end servers include a database engine server 22, a search index server 24 and a credit card database server 26, each of which maintains and facilitates access to a respective database.

The Internet-based auction facility 10 may be accessed by a client program 30, such as a browser (e.g., the Internet Explorer distributed by Microsoft Corp. of Redmond, Washington) that executes on a client machine 32 and accesses the facility 10 via a network such as, for example, the Internet 34. Other examples of networks that a client may utilize to access the auction facility 10 include a wide area network (WAN), a local area network (LAN), a wireless network (e.g., a cellular network), or the Plain Old Telephone Service (POTS) network.

The client and server machines are described in conjunction with FIG. 5 below.

Operational Overview

A system level overview of the operation of two embodiments of the invention are described by reference to FIGs. 2A and 2B. Images available for display on web pages are stored in a data structure 201, also referred to as a Gallery™ (Gallery is a trademark of eBay Inc., of San Jose, CA, assignee of the present invention). A web page 205 is encoded with an instruction or "widget tag" that invokes a utility program 203, referred to as a "gallery widget", when the web page 205 is being prepared for display.

In the embodiment illustrated in FIG. 2A, when the gallery widget 203 is invoked, it randomly selects a number of images specified in the widget tag from the Gallery 201 and places them on the web page 205 at locations 207, 209, 211 as defined

in the widget tag.

When used in conjunction with the auction facility 10 shown FIG. 1, the gallery 201 is a set of thumbnail image records stored in a data base, such as data base 23. Each thumbnail image record contains data associated with an auction item represented by the image, such as an identifier for the item, a category for the item, a date and time for the end of the auction for the item, and an address for the image itself. The widget tag is encoded on the web page 205 in a proprietary format that identifies the gallery widget, specifies the number of images required, and defines the display parameters for the images. Additional parameters, such as a category identifier for the images, can also be included. At periodic intervals, the web page 205 is regenerated by compiling the page source code into standard HTML code suitable for display by a browser, such as Internet Explorer. When the compiler processes the widget tag, it invokes the gallery widget 203 to select the images for the page 205. Thus, for example, when a web home page contains a widget tag of the format,

<Home Page Gallery, categoryID=M, numitems=N, picwidth=X, picheight=Y, picspace=Z, numrows=R, numcols=C>,

the text "Home Page Gallery" identifies which gallery widget should be invoked when the home page is compiled, M identifies a particular category of images to be displayed on the home page, N specifies the number of images, and the combination of X, Y, Z, R and C defines the coordinates on the home page for the image locations.

In an alternate embodiment illustrated in FIG. 2B, a gallery administration tool 213 pre-selects a certain number of images from the Gallery 201 to form a gallery pool data structure 215. The gallery administration tool 213 compares the images in the gallery 201 with various filtering criteria and allocates those images that meet the filtering criteria to the gallery pool 215. When the web page 205 is being prepared for display, the gallery widget 203 selects the required number of images from the gallery pool 215 rather than from the full Gallery 201. The gallery pool 215 may be used to hold images having common criteria, such as an expiration date or category. More than one image pool 215 can be created, as shown in phantom in FIG. 2B.

When used in conjunction with the auction facility 10 of FIG. 1, the gallery administration tool 211 is periodically executed by a user to choose the images for the

pool 203 that will be available for display during the next time period based on filtering criteria input by the user. The criteria may be predicated on the occurrence of a special promotion or a particular theme such as a holiday. So, for example, a marketing employee could choose a large number of appropriate holiday images to fill the pool but would not have to know exactly how many images may be used. The user is also given the option of deleting individual items from the image pool 203 and for purging all images associated with items no longer at auction. Information from the Gallery thumbnail image records that match the filtering criteria are used to create the set of gallery pool records.

The system level overview of the operation of an embodiment of the invention has been described in this section of the detailed description. A gallery widget has been described that automatically selects and places images on a web page when a widget tag encoded on the web page invokes the widget. The gallery widget can select the images from a Gallery data structure containing all available images or from one or more gallery image pool data structures created by a gallery administration tool using pre-determined filtering criteria. While the invention is not limited to any particular widget tag, for sake of clarity a specific tag format has been described. It will be appreciated that the description of the invention in terms of a web page encompasses all documents written in any markup language.

Methods of Embodiments of the Invention

In the previous section, a system level overview of the operations of embodiments of the invention was described. In this section, the particular methods of the invention are described in terms of computer software with reference to a series of flowcharts. The methods to be performed by a computer constitute computer programs made up of computer-executable instructions. Describing the methods by reference to a flowchart enables one skilled in the art to develop such programs including such instructions to carry out the methods on suitably configured computers (the processor of the computer executing the instructions from computer-readable media) If written in a programming language conforming to a recognized standard, such instructions can be executed on a variety of hardware platforms and for interface to a variety of operating

systems. In addition, the present invention is not described with reference to any particular programming language. It will be appreciated that a variety of programming languages may be used to implement the teachings of the invention as described herein. Furthermore, it is common in the art to speak of software, in one form or another (e.g., program, procedure, process, application, module, logic...), as taking an action or causing a result. Such expressions are merely a shorthand way of saying that execution of the software by a computer causes the processor of the computer to perform an action or a produce a result.

Referring first to FIG. 3A, the acts to be performed by a computer executing a gallery widget method 300 are shown. When the gallery widget is invoked during the preparation of a web page, the method 300 determines the number of images (N) specified in the gallery widget tag (block 301) and calls a random number generator, such as one commonly provided by computer operating system, requesting N random numbers (block 303). The method 300 retrieves N images using each random number as an index into either the Gallery or the gallery pool data structure (block 305). The determination to use the Gallery or one of the gallery pools may be coded in the widget or may be driven by an additional parameter in the widget tag. The retrieved images are then placed on the page at the locations specified in the gallery widget tag (block 309).

In an alternate embodiment also illustrated in FIG. 3A, the method 300 can perform an optional validation method on the images retrieved (block 307, shown in phantom). An embodiment of such a validation method 310 illustrated in FIG. 3B validates each of the images against four criteria. If the image has expired (block 311), is not an appropriate category (block 313), has been recently used (block 315), or is a duplicate of an already selected image (block 317), then another image is retrieved from either the Gallery or gallery pool to replace it (block 319). Once all images have been evaluated (blocks 321, 323), the validation method 310 returns to the gallery widget method 300. It will be appreciated that fewer or more than four criteria can be incorporated into a validation method without exceeding the scope of the invention.

Turning now to FIG. 4, one embodiment of a gallery administration tool method 400 is described. The administration tool method 400 allows a user to add (block 401) or delete (block 403) individual image records, or purge an entire group of records from the

gallery pool. When the user has completed all desired work on the pool (block 409), the method 400 exits.

If the user wishes to add an image record to the pool, he/she inputs filtering criteria (block 411), which is used to retrieve a matching record from the Gallery (block 413). The appropriate information from the Gallery record is used to create a corresponding record in the image pool (block 421). As many additional matching records can be added by user as desired (block 423) or new filtering criteria can be input (block 425).

The blocks in phantom in FIG. 4 illustrates an embodiment of the gallery administration tool that screens the selected image (block 415) to prevent, for example, an image with an offensive title from being displayed. Any image that fails the screening (block 417) is discarded (block 419) and another image selected (block 413). The screening at block 415 can be automatic based on some pre-determined standards or can be performed manually by the user.

When the user wants to delete individual images from the pool, an identifier for the image record (e.g. the identifier for the item represented by the image) is obtained from the user (block 427). The corresponding image is then deleted from the pool (block 429). If there are more images to delete (block 431), the user is given the opportunity to input another image record identifier.

The pool may need to be purged of images periodically, such as when the items represented by the images are not longer available on the web site. The user inputs purging criteria (block 405) and administration tool method 400 identifies and deletes the matching records (block 407).

One of skill in the art will immediately appreciate that while the administration tool has been described as an interactive program, the method 400 is equally applicable to being executed as a batch program driven by a set of parameters previously input by a user.

The particular methods performed by computer implementing an embodiment of the gallery widget and gallery administration tool have been described. The method performed for the gallery widget has been shown by reference to flowcharts in FIGs. 3A-B including all the acts from 301 until 323. The method performed for the gallery

administration tool has been shown by reference to a flowchart in FIG. 4 including all the acts from 401 until 431.

Operating Environment

The following description of FIG. 5 is intended to provide an overview of computer hardware and other operating components suitable for implementing the invention, but is not intended to limit the applicable environments. FIG. 5 shows a diagrammatic representation of a machine in the exemplary form of a computer system 300 within which a set of instructions, for causing the machine to perform any one of the methodologies discussed above, may be executed. In alternative embodiments, the machine may comprise a network router, a network switch, a network bridge, Personal Digital Assistant (PDA), a cellular telephone, a web appliance or any machine capable of executing a sequence of instructions that specify actions to be taken by that machine.

FIG. 5 shows one example of a conventional computer system that can be used as client or server machines. The computer system 500 includes a processor 502, a main memory 504 and a static memory 506, which communicate with each other via a bus 508. The computer system 500 may further include a video display unit 510 (e.g., a liquid crystal display (LCD) or a cathode ray tube (CRT)). The computer system 500 also includes an alpha-numeric input device 512 (e.g. a keyboard), a cursor control device 514 (e.g. a mouse), a disk drive unit 516, a signal generation device 520 (e.g. a speaker) and a network interface device 522, such as a modem.

The disk drive unit 516 represents non-volatile storage such as a magnetic hard disk, an optical disk, or another form of storage for large amounts of data, and includes a machine-readable medium 524 on which is stored a set of instructions (i.e., software) 526 embodying any one, or all, of the methodologies described above. The software 526 is also shown to reside, completely or at least partially, within the main memory 504 and/or within the processor 502 such as when it is written, often by a direct memory access process, into the main memory 504 during execution of the software by the processor 502. One of skill in the art will immediately recognize that the term "machine-readable medium" includes any type of storage device capable of storing or encoding a sequence of instructions for execution by the processor 502 that causes the machine to

perform any one of the methodologies of the present invention. The term "machine-readable medium" (or "computer-readable") shall accordingly be taken to include, but not be limited to, solid-state memories, optical and magnetic disks, and carrier wave signals that encode data signals such as when the software 526 is transmitted or received via the network interface device 522 from/to external systems.

It will be appreciated that the modem or network interface device 522 can be considered to be part of the computer system 500. This interface device 522 can be an analog modem, ISDN modem, cable modem, token ring interface, satellite transmission interface (e.g. "Direct PC"), or other interfaces for coupling a computer system to other computer systems. The computer system 500 and the external systems can be connected in a local area network (LAN) configuration or in a wide-area network WAN configuration (generically represented as network 523). The LAN and WAN can be either public or private networks. One of the most widely used public WANs is the Internet. The term "Internet" as used herein refers to a network of networks which uses certain protocols, such as the TCP/IP protocol, and possibly other protocols such as the hypertext transfer protocol (HTTP) for hypertext markup language (HTML) documents that make up the World Wide Web. The physical connections of the Internet and the protocols and communication procedures of the Internet are well known to those of skill in the art.

It will be appreciated that the computer system 500 is one example of many possible computer systems which have different architectures. For example, personal computers based on an Intel microprocessor often have multiple buses, one of which can be considered to be a peripheral bus. Network computers are another type of computer system that can be used with the present invention. Network computers do not usually include a hard disk or other mass storage, and the executable programs are loaded from a network connection into the memory 504 for execution by the processor 502. A Web TV system, which is known in the art, is also considered to be a computer system according to the present invention, but it may lack some of the features shown in FIG. 5, such as certain input or output devices. A typical computer system will usually include at least a processor, memory, and a bus coupling the memory to the processor.

It will also be appreciated that the computer system 500 is controlled by

operating system software which includes a file management system, such as a disk operating system, which is part of the operating system software. One example of an operating system software with its associated file management system software is the operating system known as Windows '95® from Microsoft Corporation of Redmond, Washington, and its associated file management system. The file management system is typically stored in the non-volatile storage 516 and causes the processor 502 to execute the various acts required by the operating system to input and output data and to store data in memory, including storing files on the non-volatile storage 516.

Conclusion

A gallery widget that provides for the automatic selection and integration of images on markup language documents, such as web pages, has been described. In one aspect, the gallery widget selects the images from a gallery containing all the available images. In another aspect, a supporting gallery administration tool creates a pool of images from those in the gallery and the gallery widget selects the images for the web pages from the pool. Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that any arrangement which is calculated to achieve the same purpose may be substituted for the specific embodiments shown. This application is intended to cover any adaptations or variations of the present invention.

For example, one of skill in the art will immediately recognize that the invention is not limited to use with an auction web site as described herein, but is suitable for use on with any web-based business that requires a frequent rotation of images on its web site pages. Furthermore, although the invention has been described in conjunction with its use on the World Wide Web, it will be appreciated that the invention is equally applicable in any environment in which images are presented to a user in documents written in a markup language, and that the terminology used in this application is meant to include all environments that incorporate a markup language. Therefore, it is manifestly intended that this invention be limited only by the following claims and equivalents thereof.

CLAIMS

What is claimed is:

1. A computerized method for dynamically selecting images for a markup language document comprising:

encoding an instruction in the markup language document, the instruction identifying a utility program that dynamically selects an image for insertion into the document;

preparing the markup language document for display;

invoking the utility program when the instruction is processed;

selecting a pre-determined number of images from a group of images, the pre-determined number being specified in the instruction; and

placing the pre-determined number of images in the markup language document at locations defined in the instruction.

2. The computerized method of claim 1, wherein the group of images comprises a gallery containing images available for display.

3. The computerized method of claim 1, wherein the group of images comprises a pool of images and further comprising:

choosing the images for the pool from a gallery containing images available for display using an administration tool.

4. The computerized method of claim 3, wherein choosing the images for the pool comprises:

obtaining filtering criteria;

identifying an image from the gallery based on the filtering criteria; and

adding the identified image to the pool.

5. The computerized method of claim 4 further comprising:

examining information associated with the image against a set of standards; and discarding the image if the information does not meet the standards.

6. The computerized method of claim 4 further comprising:
deleting an image from the pool.

7. The computerized method of claim 1, wherein the markup language document is a web page and the instruction is a tag in a proprietary format.

8. The computerized method of claim 7, wherein the utility is invoked when the tag in the proprietary format is processed during a compile of the web page.

9. The computerized method of claim 7, wherein the proprietary format comprises:
<widget identifier, number of images, display parameters>.

10. The computerized method of claim 9, wherein the display parameters comprise a size parameter and a location parameter.

11. The computerized method of claim 7, wherein the proprietary format comprises:
<widget identifier, category identifier, number of images, display parameters>

12. The computerized method of claim 1 further comprising:
validating the pre-determined number of images against validation criteria; and substituting a different image for an image that fails the validation.

13. A computer-readable medium having stored thereon executable instructions for causing a computer to perform a method for dynamically selecting images for a markup language document comprising:
determining a number of images to display in the markup language document;
obtaining a set of random numbers corresponding to the number of images;
retrieving images from a group of images using the set of random numbers; and

placing the retrieved images in the document.

14. The computer-readable medium of claim 13 having further executable instructions comprising:

validating the retrieved images against validation criteria; and

retrieving a replacement image from the group of images if a retrieved image fails the validation.

15. The computer-readable medium of claim 13 having further executable instructions comprising:

determining a location in the document for each of the retrieved images from an instruction embedded in the document.

16. A computer-readable medium having stored thereon executable instructions for causing a computer to perform a method for creating a pool of images available for display in a markup language document comprising:

obtaining filtering criteria;

identifying an image based on the filtering criteria; and

adding the identified image to the pool.

17. The computer-readable medium of claim 16 having further executable instructions comprising:

examining information associated with the image against a set of standards; and

discarding the image if the information does not meet the standards.

18. The computer-readable medium of claim 16 having further executable instructions comprising:

deleting an image from the pool.

19. A computer system comprising:

a processing unit;

a memory coupled to the processing unit through a system bus;

a computer-readable medium coupled to the processing unit through the system bus, and

an instruction embedded in a markup language document in the memory to cause the processing unit to execute a utility program from the computer-readable medium, wherein the utility program causes the processing unit to determine a number of images to display in the markup text document, select the number of images, and place the selected images in the markup language document.

20. The computer system of claim 19, wherein the utility program causes the processing unit to place the selected images in a location defined in the instruction.

21. The computer system of claim 19, wherein the instruction specifies the number of images to display.

22. The computer system of claim 19, wherein the computer-readable medium further comprises an administration program that causes the processing unit to create a group of images from which to select the number of images.

23. The computer system of claim 19, wherein the computer system is a web server and the markup language document is a web page.

24. The computer system of claim 23, wherein the web page contains images of items being auctioned on a web site hosted by the web server.

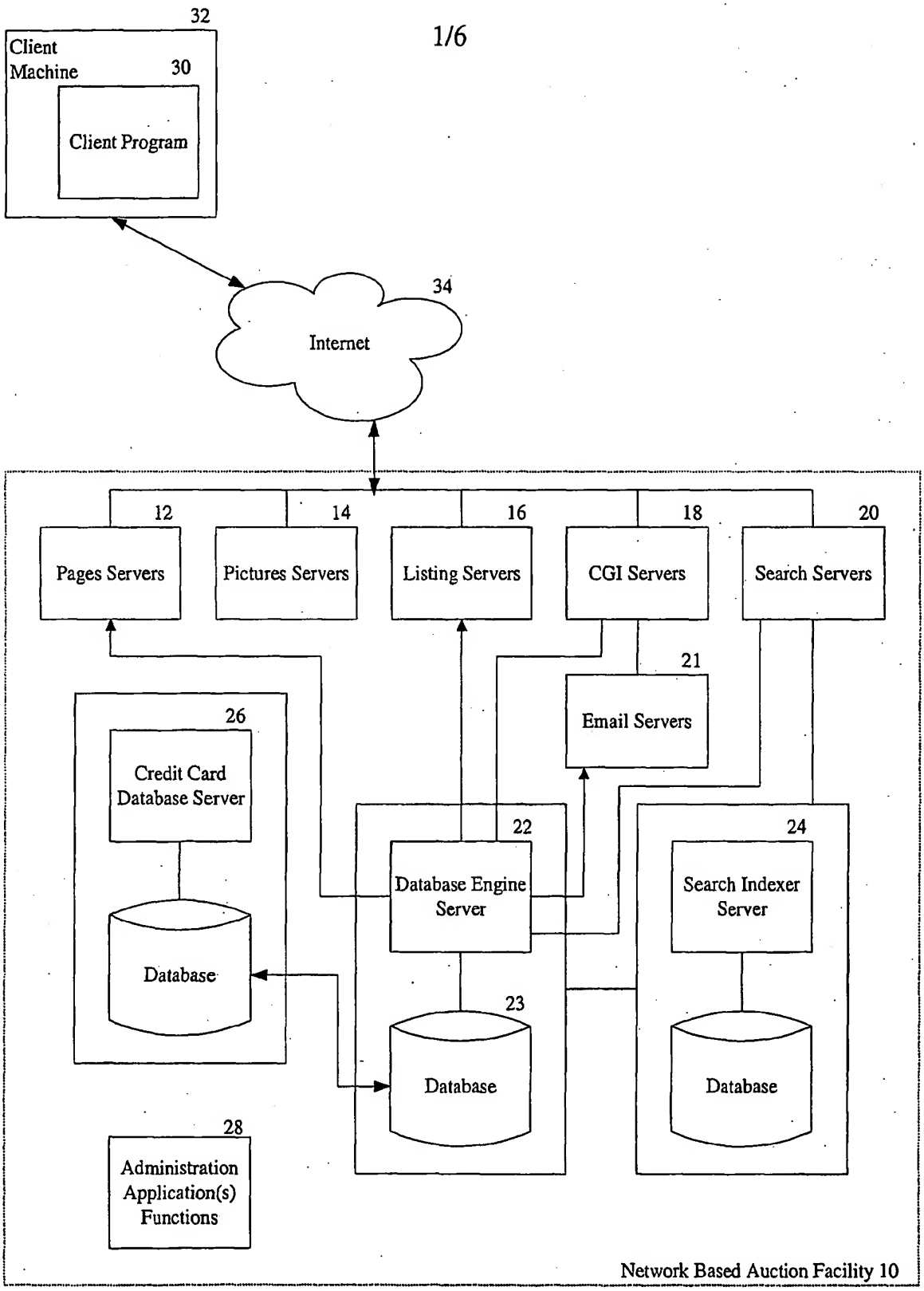
32
Client Machine
30
Client Program
34
Internet
12
Pages Servers
14
Pictures Servers
16
Listing Servers
18
CGI Servers
20
Search Servers
21
Email Servers
26
Credit Card Database Server
Database
22
Database Engine Server
23
Database
24
Search Indexer Server
Database
28
Administration Application(s) Functions
Network Based Auction Facility 10

FIG. 1

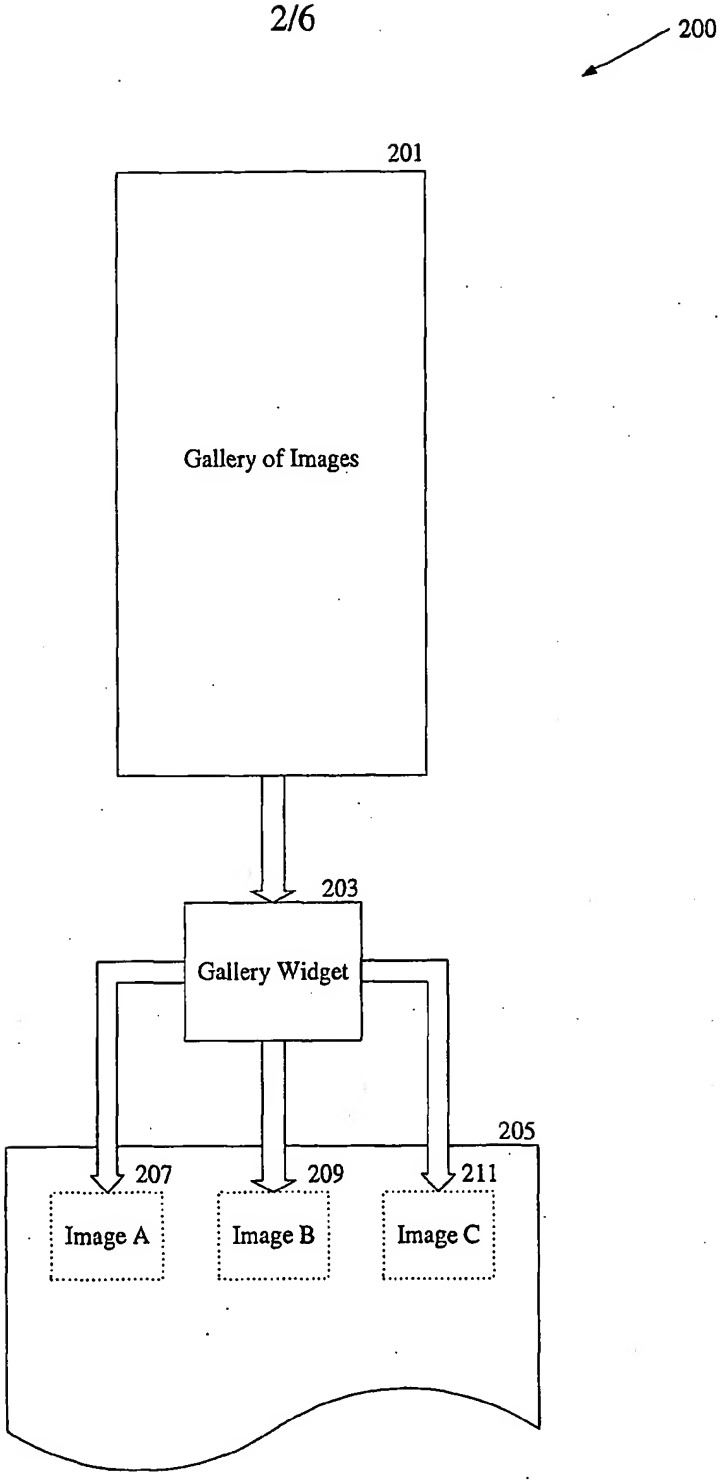
200
201
Gallery of Images
203
Gallery Widget
205
207
209
211
Image A
Image B
Image C

FIG. 2A

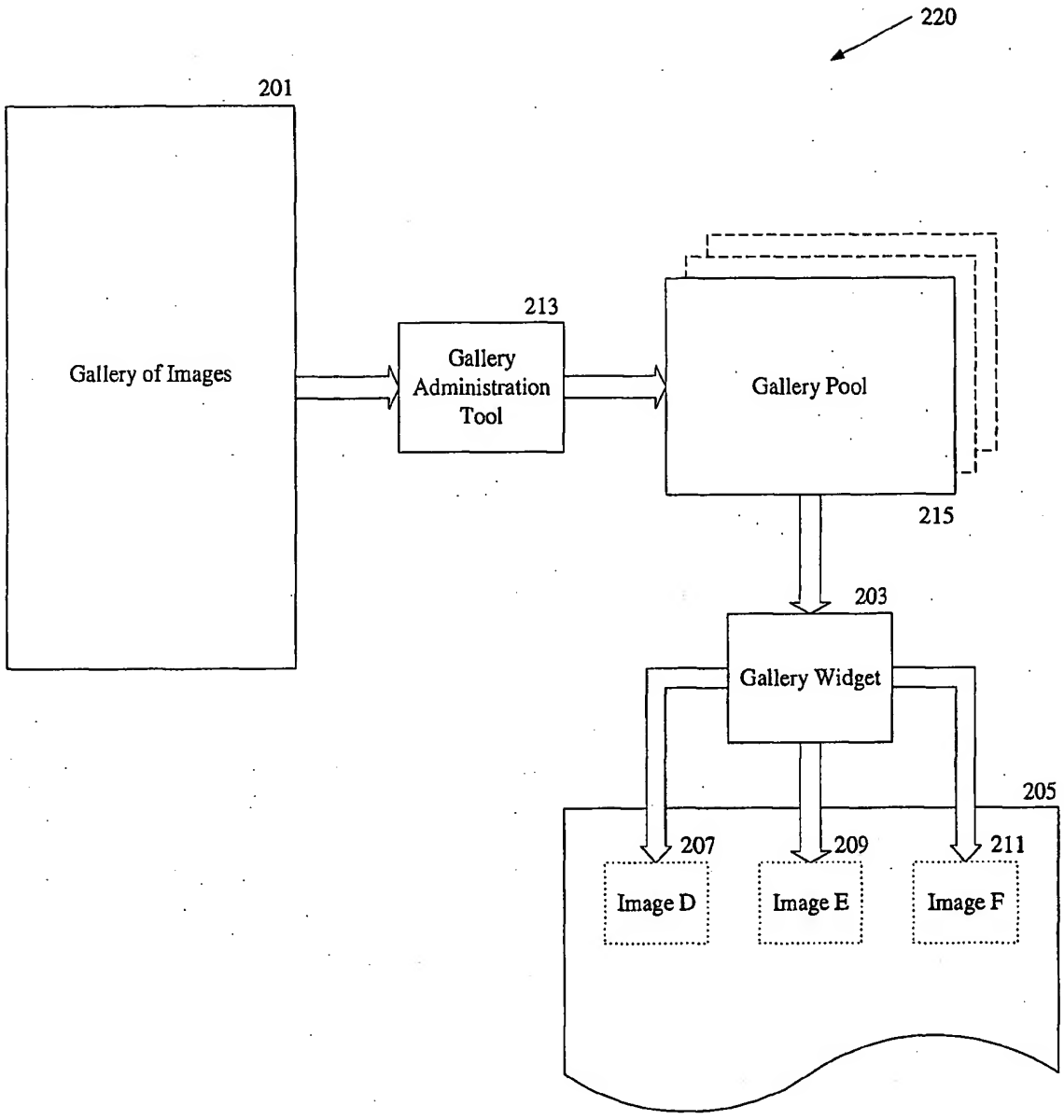
220
201
Gallery of Images
213
Gallery Administration Tool
Gallery Pool
215
203
Gallery Widget
205
207
209
211
Image D
Image E
Image F

FIG. 2B

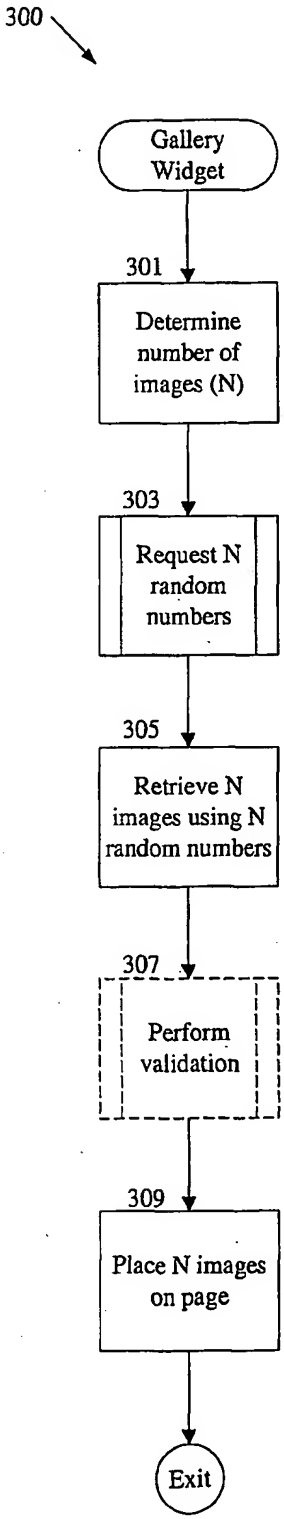
300
Gallery Widget
301
Determine number of images (N)
303
Request N random numbers
305
Retrieve N images using N random numbers
307
Perform validation
309
Place N images on page
Exit

FIG. 3A

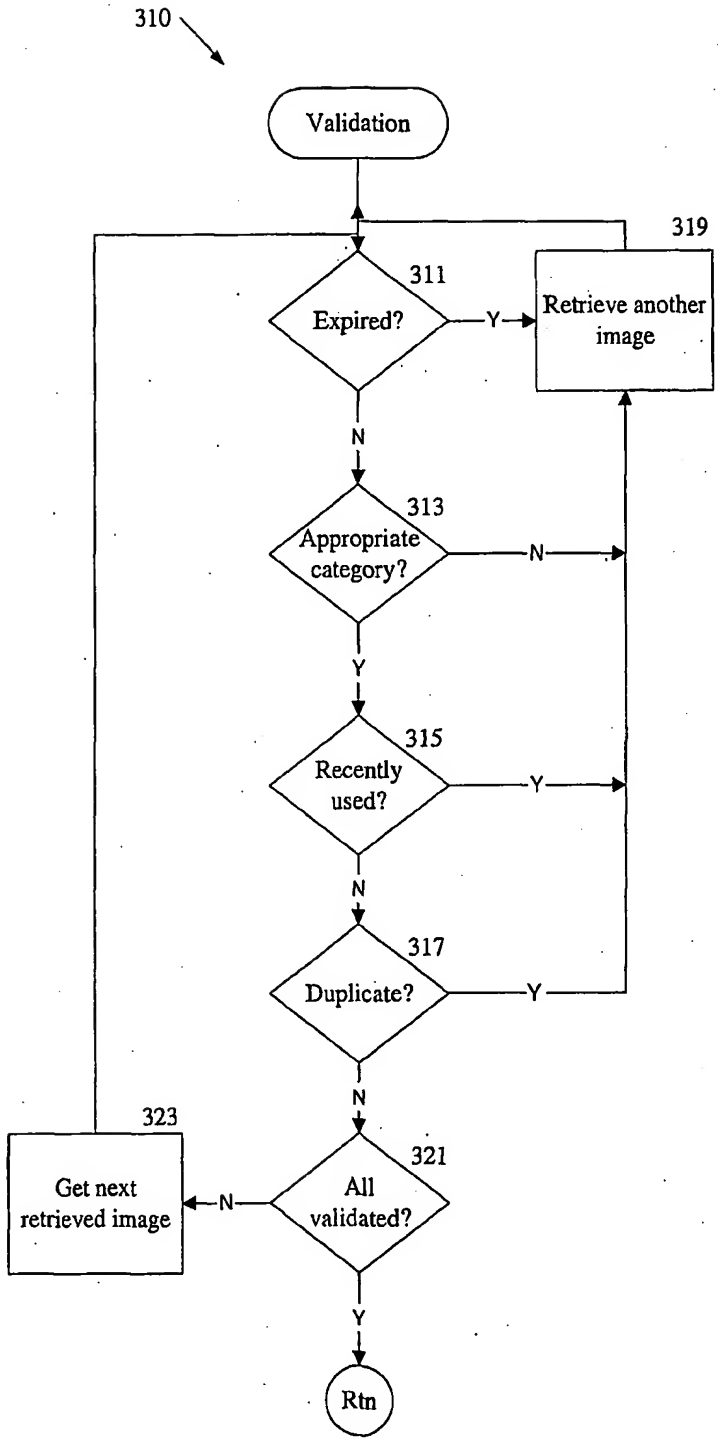
310
Validation
311
Expired?
Y
319
Retrieve another image
N
313
Appropriate category?
N
Y
315
Recently used?
Y
N
317
Duplicate?
Y
N
321
All validated?
N
323
Get next retrieved image
Y
Rtn

FIG. 3B

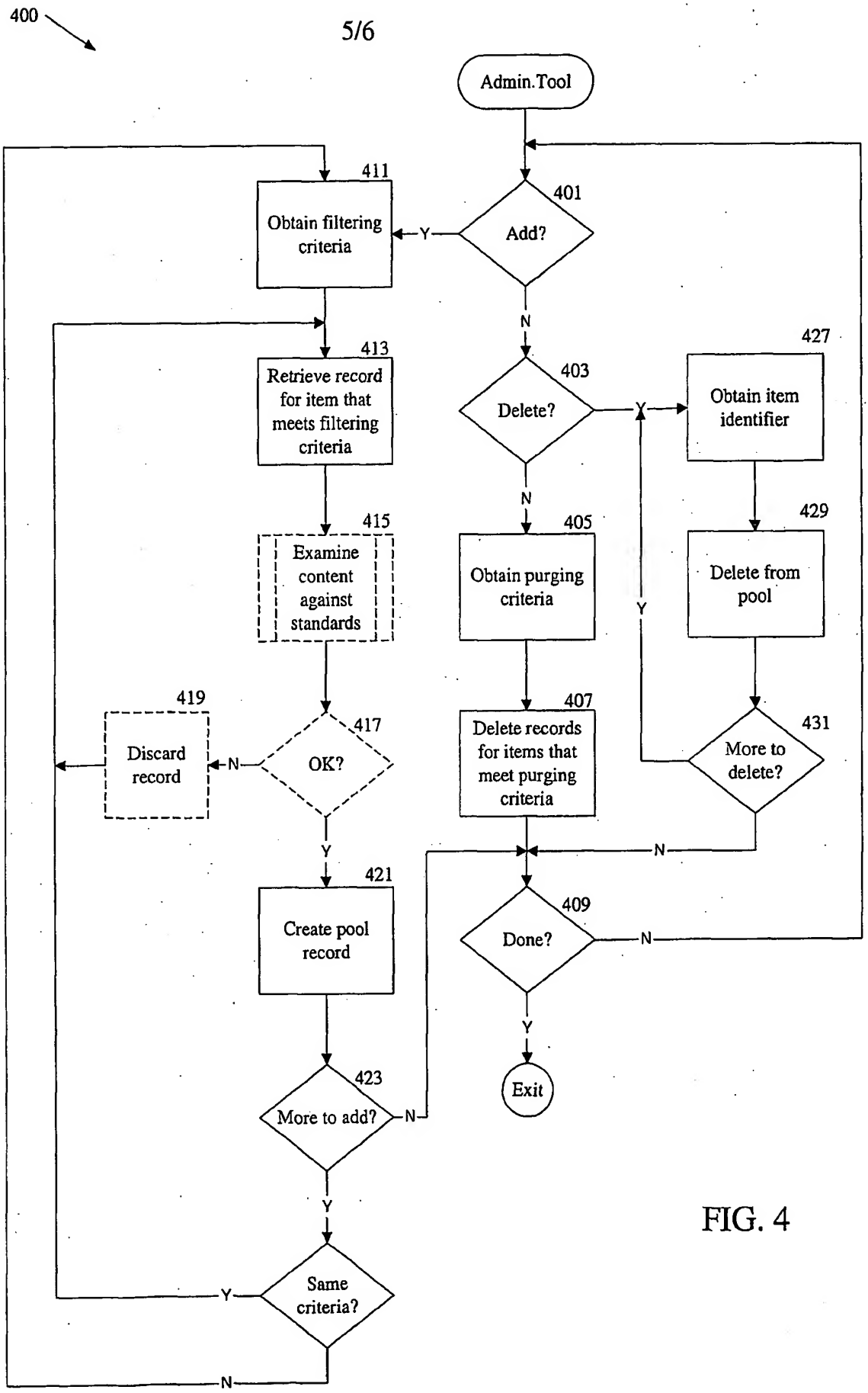
400
Admin.Tool
401
Add?
Y
411
Obtain filtering criteria
N
403
Delete?
Y
427
Obtain item identifier
N
405
Obtain purging criteria
429
Delete from pool
413
Retrieve record for item that meets filtering criteria
415
Examine content against standards
419
Discard record
N
417
OK?
Y
407
Delete records for items that meet purging criteria
431
More to delete?
Y
N
421
Create pool record
409
Done?
N
Y
Exit
423
More to add?
N
Y
Same criteria?
Y
N

FIG. 4

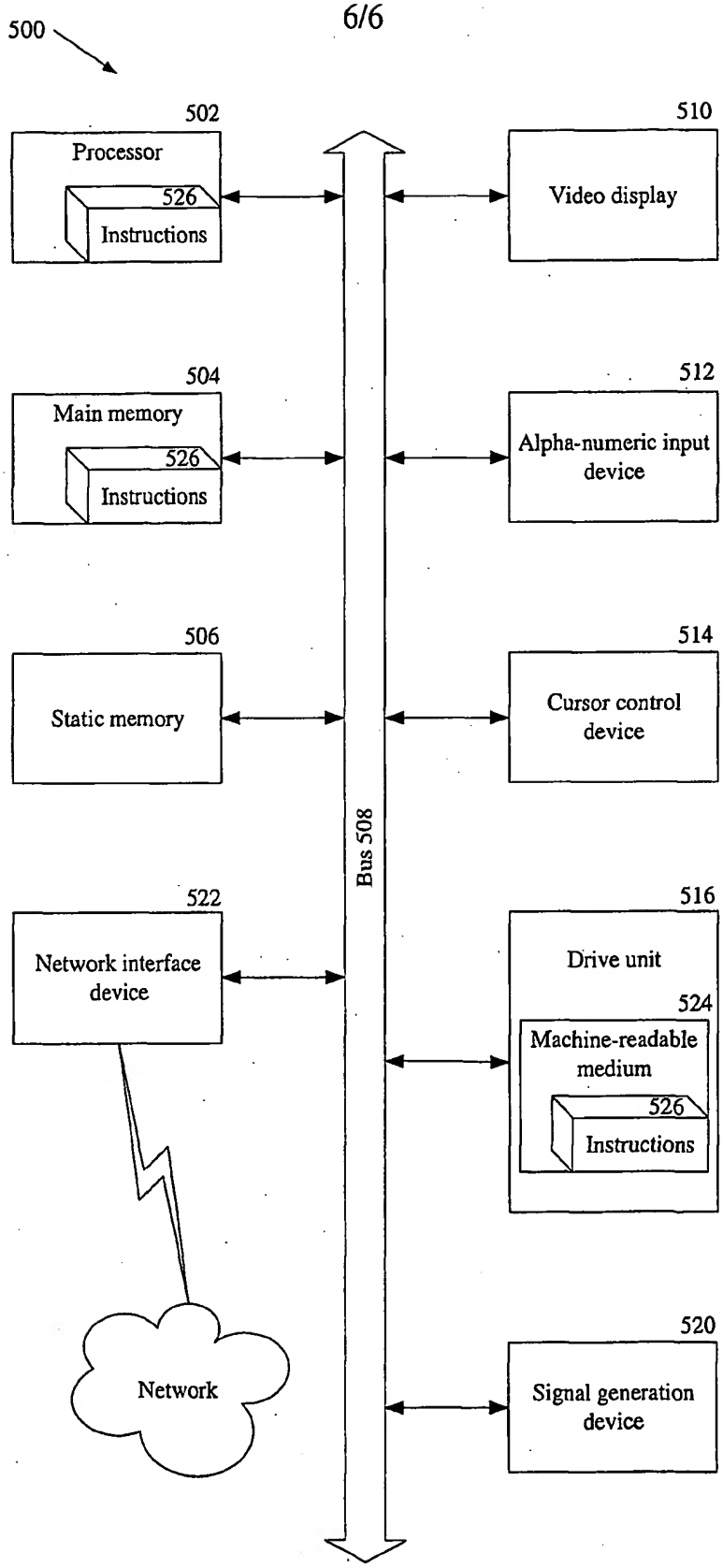
500
502
Processor
526
Instructions
504
Main memory
526
Instructions
506
Static memory
522
Network interface device
Network
Bus 508
510
Video display
512
Alpha-numeric input device
514
Cursor control device
516
Drive unit
524
Machine-readable medium
526
Instructions
520
Signal generation device

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/18225

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) : G09F 7/05
US CL : 345/744, 440, 424; 707/513, 503, 509
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 345/744, 440, 424; 707/513, 503, 509

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	US 6,128,649 A (SMITH et al) 03 October 2000 (03.10.2000), Abstract, Claims 1-24.	1-24
A	US 6,065,041 A (LUM et al) 16 May 2000 (16.05.2000), abstract, column 1, lines 6-12, column 2, lines 31-41.	7-11
A,E	US 6,269,238 B1 (IGGULDEN et al) 31 July 2001 (31.07.2001), abstract, claim 2.	1-6,13-18
A	US 6,070,125 A (MURPHY et al) 30 May 2000 (30.05.2000), claims 1-27.	1-6
A	US 5,986,662 A (ARGIRO et al) 16 November 1999 (16.11.1999), Abstract.	1-4, 12-16, 19-24

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search
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